The CHEMIST

Publication of
THE AMERICAN INSTITUTE OF CHEMISTS, INC.

Vol. XX October, 1943 No. 7

IN THIS ISSUE

War Time Packaging 441
War Research of U. S. S. R. 444
Institute's Membership Titles 449
A. I. C. New Certificates 450
Chemists Ponder Army Insecticide Problems 451
Cereal Chemists Oppose Kilgore Bill 456
Research and the Patent System 457
Using the Old Bean 464
Council 466
Chapters 470
Baltimore Chapter Planned 472
Necrology 473
Books 475
An Institute Objective Explained 486

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The Chemist

Publication of

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

60 East 42nd Street, New York 17, N. Y.

Volume XX | October, 1943 | Number 7

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Entered as second class matter April 8, 1936, at the Post Office at New York, N. Y., under Act of August 24, 1912. Issued monthly except in June, July and August at 60 East 42nd Street, New York 17, N. Y. Subscription price, $2.00 a year. Single copy, this issue $0.25.

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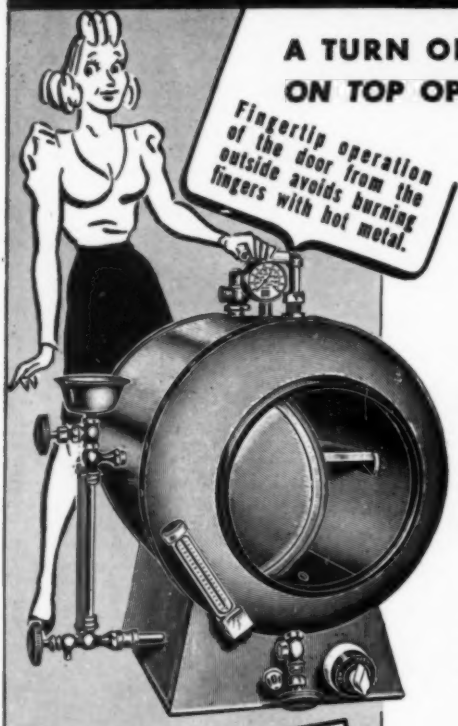

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War Time Packaging

Albin H. Warth, F.A.I.C.

Chemical Director, Crown Cork & Seal Co., Baltimore, Maryland

PACKAGING in wartime takes on a different aspect from packaging in a normal sellers' market. Extreme care must be taken in the essential details concerning military packaging, and considerably less care is taken, necessarily so, in packaging things for civilian use.

The latter is a corollary to the essential requirement for more than one reason. First, many materials used in military packaging are unobtainable for direct civilian use; and secondly, in the present market the consumption of merchandise, with its limited availability relative to actual demand, causes a rapid turnover. It is this rapid turnover of merchandise which often prevents the deterioration or spoilage which otherwise might result from long storage.

The professional chemist is playing a most important role in packaging, either in devising better ways and means of packaging for the military, or in finding "ersatz" materials and means of simplification of the material requirements for civilian use. His chief mission has been to aid the government in its war effort, to make the best use of such materials as are available, and to conserve materials wherever it is possible to do so.

The packaging chemist, as we might name him, to accomplish anything worth-while must have an intimate knowledge of the item which he is to pack. If the item to be packaged is a food, a knowledge of the mode of its preparation is quite essential, as is also the type of spoilage which might be encountered with improper packaging. Each type of food must be considered as an entity by itself. This can be easily illustrated by the packaging specifications issued for use in shipping dehydrated foods. If the item to be packaged is a drug or chemical, a knowledge of its approximate composition is necessary.

It is somewhat of a task to attempt to classify containers and wraps. Broadly speaking, we might classify them in groups relative to the materials used in their construction. These groups are (1) fibroid, (2) metal, (3) glass, (4) plastics. In

group one we have the cartons and boxes, bags, and wraps. In group two we have cans, tubes, vials, wraps, and closures. In group three we have bottles, and jars. In group four containers, closures, and wraps.

With a fundamental chemical and physical knowledge of the group materials, and by equipping himself with an understanding of packaging law, government specifications, methods and processes of labelling, chemistry of adhesives, machinery, and equipment, and shipping procedures, the chemist should be successful in his endeavors in wartime packaging, and he should in wartime leave the displays to the advertising manager.

The group of fibroids includes the cellulosic materials such as wood, cardboard, paper and fiber. These fibroids are often impregnated, coated, or faced with protective materials, since cellulose material is absorptive to moisture, oil and the gases. The group of metals includes tinplate, terne-plate, steel plate, bonderized plate, galvanized sheet, and nonferrous metals in thicknesses ranging from thin foil to heavy plate, as for example aluminum. The group of glass includes bottle glass, opal glass, stoneware, and porcelain. Plastic resins would include Bakelite, urea formaldehyde, lignin, polyvinyl acetals, and others.

In the sense applied here, packaging refers to the primary containers of a product rather than to its shipping container. The latter is referred to as packing. The can that holds the corn is the package, and the box that carries the cans is the packing.

Although we have classified the packaging materials in four groups, each group of which has a number of divisions and subdivisions, there are in practice numerous cross linkages of the groups, e.g. a metal closure on a glass jar, or a plastic cap on a collapsible tube, or a paper cannister with metal ends. In all such cases the package is placed in the group to which the body or side walls of the container belongs. For example, a paper cannister with metal ends is essentially a paper cannister and not a tin can, even though it might be made by the tin can manufacturer.

It can be at once visualized that the combination of the materials possible in packaging is indeed great, should we consider the subdivisions under the divisions. Under paper alone we have many kinds, such as sulfite, sulfate, kraft, express, glassine, parchment, manila, etc., together with the numerous available weights per ream. Cellophane is classed with the fibroids since in substance it is a regenerated cellulose.

It is also because of the wide variety of packaging materials at our disposal that the chemist is able to make numerous combinations and

substitutions through interchange of the component parts of a container, or through making radical changes in the container as a whole. For example, a paint packaged in tin was later packaged in glass. Glass was not found suited to large size packages, so the paint was then packaged in oil-proof fibre cannisters with metal ends, one end having a friction lid. The metal end however, had to be changed from tinplate to black plate, and the packaging chemist had to seek a means of protecting the black plate from rusting and stouten the fiber sidewall to prevent it from collapsing.

Important considerations that enter into the picture of wartime packaging in containers, might be summed up as follows:

1. Availability of materials for constructive use.
2. Weight and size of the container.
3. Type of equipment required and its availability in sufficient amounts.
4. The stability and appearance of the package and its contents as it reaches the consumer. Many packages must be hermetically sealed.
5. The adaptability of the package to the proposed scheme of packing for shipment.
6. The speed of filling and the amount of labor involved in packaging.
7. The cost in relation to the price ceiling already established for the material package.
8. If the package is a military one, the proofness of the package against adverse climatic conditions, rodents, insects, and poisonous gases when shipped to the area of combat. In military parlance the package must be adequate.

As far as military packaging is concerned the subsistence items are very largely carried in tinplate; that is, hermetically sealed rigid metal containers. Glass has been limited to those items which virtually require it. Its objectionable feature is in the unusually large amounts of packing materials required for its safe carriage and storage under overseas shipping conditions and transportation on land to the area of combat.

Textile bags of multiwall paper and cloth construction, some of the layers of which are asphalt-laminated, wax dipped, or otherwise waterproofed, are adapted for packaging beans, peas, rice, flour, sugar, and salt. Emergency ration packs and medical supplies offer many problems, the latter with regard to reclosure features when in use. The dry packaging of machinery for overseas shipment has already made enormous strides, greatly aided by the use of silica gel as an absorbent in packaging.

The packaging chemist is thus limited in his endeavor by the many restrictions of war-time requirements, but in spite of these, he is improving the methods and means of satisfactorily dealing with the problems presented to him.

War Research of U.S.S.R.

J. G. Tolpin, F.A.I.C.

Universal Oil Products Company, Chicago, Illinois

IN AN exchange of letters between Professor Lena Stern, the only woman member of the Academy of Sciences of the U.S.S.R., and Sir Henry Dale, President of the Royal Society of London, which was published in *Nature* of July 17, 1943, Professor Stern declares:

> The work which is being carried on so intensively at our factories and mills, in our research institutes, in our university departments and in our war hospitals is wholly directed towards helping the front, to perfecting the arms of war, to protecting the health of our fighters.

This statement is certainly a source of encouragement, especially when the nature of some researches which Professor Stern apparently has in mind is considered. The programs of research had been conceived and began before the actual outbreak of the present war. However, despite the fact that the Academy of Sciences of the U.S.S.R. was moved to Sverdlovsk in the Ural Mountains, and many of its institutes, laboratories, and publications scattered, these programs are being carried out for the most part as originally scheduled. Reports indicate lively research activity going on in these institutes, as well as in the provincial divisions of the Academy of Sciences, such as the Ural Division and the Georgian Division.

S. I. Vol'fkovich, corresponding member of the Academy of Sciences of the U.S.S.R., recently published a partial roster of scientists and engineers who were awarded Stalin prizes, ranging from 25,000 to 100,000 rubles, for outstanding achievements resulting from their researches carried out in 1940 and 1941. Although the issue of the *Bulletin of the Academy of Sciences of the U.S.S.R.* in which the article by Professor Vol'fkovich appears was published in Kazan a little less than a year ago, it did not reach this country for quite some time because of shipping difficulties.

Stalin prizes have been awarded by a special committee of the Government, since 1939, for important accomplishments in the sciences, the arts, technology, and the humanities.

Some of the chemists mentioned in the last two lists of awards have published much research in the fields of study for which they were honored, and the nature of their work is well-known. Others have been engaged in research of purely military significance, and little has been published of their work. The diversity of subjects covered by the present-day chemical research in the U.S.S.R. is illustrated by the reports of the sessions of the Department of Chemistry of the Academy of Sciences. The February, 1942, session of this department was devoted exclusively to the research of the Radium Institute, in commemoration of the twentieth anniversary of this institute; the March, 1942, session dealt with infra-red spectral analysis and the mechanism of detonation of explosives; the May, 1942, session was partly devoted to a paper reviewing the scientific works of Professor Gilbert Newton Lewis of the University of Southern California, who was elected at that session an honorary member of the Academy of Sciences of the U.S.S.R.; and the July session was concerned with anodic oxidation of aluminum and its alloys. In addition, research on acetylene derivatives, on platinum metals, and on other subjects was reported.

Ample assistance is provided by the state for every worthwhile project. Although the number of college-trained chemists in the U.S.S.R. was estimated at the beginning of 1941 to have reached 50,000, indications were available that there were vacant positions for chemists, since the third Five-Year Plan (1938-1942) called for a greater development of the chemical industries than in any other period and was, in fact, referred to as the Chemical Five-Year-Plan. The Soviet chemical industry was in a large measure created in the period between the two World Wars, and Soviet estimates show that in 1941 only four per cent of the production of the chemical industry came from plants in existence before the industrialization of the country was begun.

The editors of the *Journal of Applied Chemistry of the U.S.S.R.* stated recently that on the eve of the present war (1941) there were over forty research institutes serving exclusively the chemical industry of the U.S.S.R., and seventy special colleges or college departments for training chemical engineers. These colleges had an enrollment of 35,000-40,000 students, and graduated on the average 5,000 chemists and chemical engineers a year.

Many of the scientists whose work gained them distinction are well-known to their colleagues abroad. Their achievements deserve, however, more general notice on the part of American scientists, and this account purports to call attention to some of these researches, particularly in the fields of chemistry and chemical tech-

nology. The following abbreviated list shows some of the accomplishments which won Stalin prizes for the scientists responsible for them:

Biochemistry

Research on biochemistry; specifically, application of the results gained in the research on the action of ferments and on the chemistry of breathing to industrial biochemical processes. The results of this work were helpful in raising crops more resistant to cold and drought. improving the production of tea, baking bread, making wine, storing fruit and vegetables, and drying cereals harvested before maturity. The last named is stated to be of importance for harvesting in rainy years. Perhaps it also had military significance when grain was to be harvested before time in order to prevent it from falling into the hands of the enemy.

(*A. N. Bakh, President of the Mendeleev Chemical Society*).

Rubber Synthesis.

Development of an improved method of synthesis of isoprene rubber, a result of Favorskii's numerous researches on unsaturated hydrocarbons, which were published during the last fifty years. The award for this work shows the great interest the Soviet government has in the research on rubbers other than butadiene rubber, which is the basis of the Soviet synthetic rubber industry.

(*A. E. Favorskii*).

Aromatic Hydrocarbons

Conversion of petroleum constituents into aromatic hydrocarbons, including toluene, and also into alcohols, aldehydes, etc.; research on catalytic cracking. Zelinskii has received awards for numerous other achievements in recent years.

(*N. D. Zelinskii*).

Aviation Gasoline

Development of improvements greatly increasing the manufacture of aviation gasoline.

(*B. M. Rybak and co-workers*).

Octane Rating Apparatus

Apparatus for the determination of the octane rating of motor fuels which is simpler and cheaper than the Waukesha engine.

(*B. Z. Rudoi, of the Institute of Mineral Fuels*).

Combustion Theories

Theory of chain reactions and theory of combustion. These theories are stated to have led to methods of determining intermediate products in combustion processes and to the discovery of a number of important phenomena. The velocity of propagation of flame and inflammability limits can be predicted on the basis of the theory of combustion and detonation can be calculated. The theory of combustion is also helpful in explaining the phenomena occurring in the combustion of fuel in internal combustion engines.

(*N. N. Semenov and co-workers*).

New Explosives

Invention of new explosives from abundantly available raw materials, the value of which was recognized in industry and on the battle front.

(*A. N. Kuznetsov, M. M. Fainberg, and co-workers, of the Leningrad Mining Institute and the Karpov Institute of Physical Chemistry*).

Theory of Glass Structure

Theory of the structure of glass, which describes the glass as a mesh formed by anions, with the cations being capable of more or less free motion. Application of this theory is stated to have led to the development of important borosilicate glasses of great value in optical work. It is used in almost all Soviet plants making optical war equipment.

(*I. V. Grebenshchikov*).

Anhydrite Cement

Development of anhydrite cement, which is being manufactured on a large scale, and is said to be an important building material.

(*P. P. Budnikov and co-workers*).

Porcelain Insulation

Invention of an improved "ultra-porcelain" insulating material, which is already being produced on a large scale.

(*N. P. Bogoroditskii*).

Apatites and Phosphorites

Research on processing native apatites and phosphorites providing for complete utilization of their phosphorus, calcium, and fluorine. This research led to methods of production of highly valuable fertilizers, control of agricultural pests, and methods of production of rare earths of the cerium group.

(*S. I. Vol'fkovich and co-workers, of the Institute of Fertilizers and Insectofungicides*).

Electrochemistry

Theory of electrode processes based on research on the structure of double electrical layers; research on atom layers absorbed on electrodes, electrokinetic behavior of metals, overvoltage, and similar phenomena. This work is of importance in the understanding of corrosion, chemical sources of electrical current, and industrial electrolysis.

(*A. N. Frumkin*).

Raman Spectroscopy

Further developments in the application of Raman spectroscopy. The phenomenon of combination scattering of light was discovered by Mandel'shtam and G. S. Landsberg simultaneously with Raman.

(*L. I. Mandel'shtam*).

Theory of Catalysis

Theory of catalysis. Roginskii established the high significance of minute quantities of impurities on the surfaces of catalysts for their specific effects.

Analytical Methods

Physicochemical method of analysis, characterized by application of geometrical methods to the study of

the relationship between composition and properties of equilibrium systems. This method, developed by the late Professor Kurnakov, led to the prognosis of rich deposits of potassium, magnesium, and other salts in the Soviet Union; it also found wide application in research on and the manufacture of alloys.

(*N. S. Kurnakov and co-workers*).

Armor Steel

Development of a new type of armor steel and of a method of its production.

(*G. I. Nosov and co-workers, of the Magnitogorsk Metallurgical Combine and the Research Institute* 48).

Carbon Ferrochromium

Metallurgy of carbon ferrochromium in blast furnaces.

(*V. V. Mikhailov and co-workers*).

Ferrovanadium

Metallurgy of ferrovanadium.

(*M. N. Sobolev and co-workers*).

Molybdenum

Development of a successful method of producing molybdenum.

(*E. I. Antonovskii and co-workers*).

Aluminum

Development of a method of large-scale manufacture of aluminum from Ural bauxites.

(*F. F. Vol'f and co-workers*).

Study of Surface Phenomena

Research on surface phenomena and the effect of small additions of active substances on the properties of solids. This work led to the development of new cutting fluids which facilitate the machining of metal. Substances were also developed as a result of these studies which reduce the hardness of geologic formations in drilling.

(*P. A. Rebinder*).

Soda and Ammonium Sulfate

Development of a new method of manufacture of soda and ammonium sulfate from mirabilite, resources of which are very extensive in the U.S.S.R.

(*A. M. Polyak and co-workers*).

Sulfuric Acid Manufacture

Improvements in the contact method of sulfuric acid manufacture through perfection of the method of preparation of the vanadium catalyst and the refining of the gases handled.

(*G. K. Boreskov and A. G. Amelin*).

Nitric Acid Industry

Suggestion of a method of intensification of the nitric acid industry, which is stated to have high defense value.

(*I. N. Usyukin*).

Fire-resistant Cloth

Invention, now being used by industry ,of a simple method of making cloth fire-resistant and water-repellent.

(*Z. A. Rogovin and co-workers, of the Mendeleev Institute of Chemical Technology and the Institute of the Cotton Industry*).

Latex Preparation

Development of a method of preparation of latex from synthetic rubber.

(*B. A. Dolgoplosk and B. A. Dogadkin*).

Vinylacetylene Derivatives

Synthesis of vinylacetylene derivatives used by optical, machine-building, and other industries as adhesives.

(*I. N. Nazarov*).

Cyanine Dyestuffs

Invention of cyanine dyestuffs and photosensitizers. (*A. I. Kiprianov*).

Pharmaceuticals

Inventions in the field of pharmaceuticals, including sulfamide preparations. (*O. Yu. Magidson*).

Anesthesia

Development of the widely used method of novocaine anesthesia and a new type of bandage.

(*A. V. Vyshnevskii*).

In addition to the impetus given to chemical research by the Stalin prizes granted by the Soviet government, the Chemical Society of the U.S.S.R. also actively encourages research. A Russian chemical journal just received contains a news account of a contest conducted by the Mendeleev Chemical Society for the best research in chemistry. The researches offered were to be judged on the basis of the following criteria: (a) importance to the war effort; (b) significance for the national economy; (c) novelty of methods used and objects of the investigation selected; (d) quality of the work carried out; (e) theoretical value of the data obtained. The day on which the researches were to be submitted was postponed from January 1 to May 1, 1943. Ten prizes, ranging from 1,000 to 5,000 rubles, and ten certificates of merit, were to be awarded.

Membership Titles in Institute Changed

By constitutional amendment, THE AMERICAN INSTITUTE OF CHEMISTS has revised the titles of its membership from Fellows, Associates, and Juniors, to Fellows, Members, and Associates. The qualifications remain the same for the three ranks of membership.

Pharmacy Act Revised

The word "chemist" in the Pharmacy Act of Ontario, Canada, has been replaced by the term "pharmaceutical chemist", in accordance with recommendations made by the Canadian Institute of Chemistry. Formerly, the use of "chemist" in the Pharmacy Act restricted the word legally to describe only those qualified in pharmacy.

Penicillin Expansion Program Approved

A $3,000,000 expansion program for the production of penicillin has been approved for nine firms by the War Production Board. The nine companies and their total production programs are: Abbott Laboratories, North Chicago, $239,000; Reichel Laboratories, Kimberton, Penna. for laboratories at Phoenixville, Penna, $532,831; Upjohn Company, Kalamazoo, Michigan, $100,000; Bayer Company division of Sterling Drug Company, Inc., manufacturing for Winthrop Chemical Company, Rensselaer, New York, $50,000; Commercial Solvents Corporation, Terre Haute, Indiana, $441,700; Eli Lilly and Company, Indianapolis, $370,000; Lederle Laboratories, Inc., Pearl River. N. Y., $830,596; Schenley Research Institute, Lawrenceburg, Indiana, $24,781; and Cutter Laboratories, Berkeley, Cal. $420,664.

Merck Company, Rahway, N. J., Charles Pfizer and Company, Brooklyn, N. Y., and E. R. Squibb and Company, New York, have already expanded their facilities for the production of penicillin.

Stuart W. Coleman, formerly general sales manager of Mallinckrodt Chemical Works, St. Louis, has been appointed to the position of vice president in charge of sales.

New Certificates For Members

New certificates are available to INSTITUTE members who now have the old form of certificate on which dues' stamps were attached. New certificates may be obtained from the Secretary of the INSTITUTE.

Wright Elected President

Thomas A. Wright, F.A.I.C., has been elected president of Lucius Pitkin, Inc., consulting and analytical chemists, with laboratories in the Pitkin Building, 47 Fulton Street, New York 7, N. Y. Mr. Wright served some years ago as a councillor in the New York Chapter of the INSTITUTE. He is a past president of the Association of Chemists and Chemical Engineers, treasurer of The American Council of Commercial Laboratories and president of The Plainfield (N. J.) Engineers Club.

Mueller with Refined Products Company

Arthur S. Mueller, F.A.I.C., formerly of United Merchants and Manufacturers Management Corporation, New York, is now technical director of Refined Products Company, Lyndhurst, N. J.

Chemists Ponder Army Insecticide Problems

Don Stetson

Agricultural Insecticide and Fungicide Association

TWO billion dollars a year and the work of a million men are the cost to Americans of insects preying on farm crops. The problem is a chemical one, to combat and conquer these enemies of man.

Dr. P. N. Annand, chief of the U. S. Bureau of Entomology and Plant Quarantine, makes the two billion dollar estimate. Dr. L. O. Howard, a chief before him, is authority that "insects in this country continually nullify the labor of a million men".

Equally important, part of the same agricultural and chemical problem, are plant diseases. Cost estimates on these are harder to get. Most adults have read of the great potato famines in Europe and Ireland in the Nineteenth Century, caused by the potato blight. Our own mid-west has painful memories of wheat crops ruined by rust or smut within the last two generations. Such plant epidemics may well account for the work of another million men.

The wartime chemist has still other great fields, closely allied. One is the defense against insects that prey upon animal life, important always to agriculture and desperately vital now to fighting men in malaria and typhus regions. Another is plant hormones, whose use in increasing food production is only beginning to be explored.

Entomologists and plant pathologists say that without adequate pest control it would be impossible to feed our own people, let alone meet our wartime agricultural goals. Both groups of plant physicians maintain that control still is far from ideal, in some instances still not adequate. They look to the chemist for better weapons.

The answers are being provided both by new chemical compounds and by improved forms and variations of older insecticides. Among the latter is arsenic, so essential that American farmers use up to 150,000,000 pounds a year of arsenic compounds—lead arsenate, calcium arsenate, and combinations of arsenic with zinc, sodium, magnesium or copper.

The arsenic compounds are strong medicine to the foliage of some crops on which they are sprayed or dusted

for insect protection. Chemists and horticulturists found the foliage burning traceable chiefly to water-soluble arsenic. So the chemists have been developing compounds that will evolve a minimum of water-soluble arsenic even under adverse conditions.

Another important material is copper, which functions primarily as a fungicide. Its first popular form was in Bordeaux mixture, still often homemade by mixing copper sulfate with hydrated lime in water. A prominent plant pathologist recently said that Bordeaux "could be nearly a universal fungicide" . . . if weather and other conditions could be controlled. In actual practice Bordeaux, like the arsenicals, can be hard on plants at times, and chemists are developing other copper forms.

Much of the research is on fixed or low-soluble copper compounds which, unlike Bordeaux, contain no lime. Basic chlorides or copper oxychlorides, copper oxides, basic copper sulfate, and miscellaneous other forms all are now being used. Another new group of fungicides is being developed in the organic field, for example compounds of organic sulfur and copper.

These are reported as showing "rather extreme specificity" in their fungicidal action, causing new types of injury and "in one case a peculiar type of growth promotion." Copper naphthenate is described as "a powerful fungicide but difficult to use." Developing such formulae requires an expert chemist with training in the biological sciences, and with access to the work of plant pathologists, plant physiologists, entomologists and agronomists.

Nicotine, an old standard for sucking insects, also has branched out through chemical research; the familiar nicotine sulfate form is only one member now of a growing family. There are other forms of fixed nicotine in various strengths and combinations; high-strength free nicotines to be vaporized by heat; nicotine alkaloids and nicotine bentonite. All have specialized lists of uses, and research is expanding the lists.

Arsenic, copper, and nicotine are old, though giving birth to large new families. New chemical materials are building up another impressive family of plant medicinals, some to fight "on their own", others to substitute or alternate for war-scarce materials. Among the latter are the thiocyanates, introduced several years ago as extenders and activators for rotenone and pyrethrum. That function was important in peacetime to save expense; war has multiplied its importance to stretch the reduced rotenone and pyrethrum supplies.

Chemists have worked out a sizeable list of other activators and extenders, and the list is growing. These will continue to be important in peace.

An entomologists' meeting hears that styrene dibromide is an efficient substitute for pyrethrum against corn earworm. Ferric dimethyl dithiocarbamate is offered as a spray for blue mold on tobacco seedlings.

A California plant pathologist gets promising results with monocalcium arsenite in not only controlling active fungus disease but (reportedly for the first time) eradicating the masses of inoculum on fruit trees which usually carry over a nucleus of infection through the winter. A distillate from Southern pine stumps is offered as a substitute for formaldehyde against smut on onion crops.

Chemists were essential in the comparatively recent development of cryolite, both natural and precipitated forms, as a large-scale insecticide alternating in wartime for less plentiful materials. Chemists also have had essential roles in recent searches for new vegetable sources of insecticides: The yam bean, sabadilla seed, castor bean, and others. They cooperated with horticulturists in selecting the best rotenone-bearing and pyrethrum stocks to plant in South and Central America and the southern portions of the United States. As these new acreages are developed, chemists will be essential in testing and selecting among the new plants.

Another chemical field of usefulness to the farmer is in soil fumigation, against fungus diseases and against the larvae of such pests as the Japanese beetle. Methyl bromide, ethylene dichloride, chloropicrin and carbon bisulfide are among materials being used; chemists are working on others. Still closely allied to the farm front is insect and disease control on trees; some authorities argue that such lumber conservation may become as important as conservation of food.

Some problems of the agricultural pest control chemists are analagous to human medicine. He must, for example, kill the invading organism without killing or injuring the patient—which calls to mind the early unpleasant reactions from the sulfa drugs, or the armor-coating of the spirochete and the tubercle bacillus.

This is particularly ticklish in the case of fungi, which in many respects are much like their unfortunate hosts even though dissimilar in their vegetative structure. It is often difficult to select a chemical that will kill one plant and not the other.

Establishing compatibility has been a large problem not only in combining insecticides with fungicides for one-shot protection, but in combining two or more insecticides. Such a mixed prescription was required for use on cotton.

Calcium arsenate does a good job of killing the cotton boll weevil. But, to quote Dr. C. O. Eddy of Louisiana Agricultural Experiment Station, the arsenate applications are followed by a heavy build-up of the

cotton aphid population "so pronounced that the good effects of controlling the boll weevil often are offset by the resulting injury from aphid damage".

On cotton the trouble is comparatively easily overcome by including nicotine or rotenone in the calcium arsenate dust, solving the problem but leaving the curious-minded chemist to puzzle over this aphid trait. But in other cases, developing compatible combinations in which neither material would reduce the other's effectiveness has been a serious matter. A recent case was the study of various materials used to dilute copper fungicides.

Chemists found that materials containing considerable amounts of protein reduced the fungicidal value; those with little or no protein did not. Experimenters concluded that there probably was a reaction between the toxic copper and the protein, "thus reducing the amount of toxic copper available to the (fungus) spores".

Derris powder (one of the standard rotenone-bearing materials) and pyrethrum powder were prominent among the protein materials—a blow to hopes for insecticide-fungicide combinations of these materials with copper. But further research suggested the hope that this could be overcome by using, instead of the whole powder, only the extracted insecticidal fractions of the rotenone and pyrethrum.

Opposite to incompatibility, of course, is synergism, the team-work of materials which boost each others' effectiveness. Agricultural chemists have made good use of this. Activators employ this effect.

Still in the farm field are the hormone sprays. These, while not insecticides or fungicides are serviced by the same industry, and follow the fruit tree spraying schedules. In one of the first U. S. Department of Agriculture tests, two trees were sprayed and two adjoining them were not. By the third day two bushels of windfall fruit accumulated under the untreated trees while only 12 apples dropped prematurely from those sprayed with hormones. The Department foresees a saving to apple and pear growers of $3,000,000 to $4,000,000 a year.

Despite this history of progress, constant research testifies that entomologists, phytopathologists and horticulturists still are not satisfied with some of the chemicals they have been given. There still are insects and plant diseases for which no really effective control material has been found.

Federal and State agricultural experts campaign for much wider use of those control methods which have been approved. A National Cotton Council spokesman, for example, reports that "only fifteen per cent of the cotton farmers practice insect

control", though they suffer "an annual insect loss up to two hundred million dollars".

That, of course, is a problem of education. There's another chemical problem, however, worth mentioning on the farm subject. It arises from the more radical advocates of public health protection.

The agricultural insecticide and fungicide industry has long recognized that some of its powdered white toxic materials could be mistaken for flour or baking powder. Its chemists have worked out ways to color lead arsenate, calcium arsenate and some other materials, and such coloring has been done for years. But there is continuing pressure to extend protective coloring all down the list, faster than dyes and methods can be worked out. Furthermore, the forty-eight different states are inclined to require as many different colors, to the serious confusion of the problem and all concerned with it.

It is not simple. The laboratory chemist must determine that the dye does not react unexpectedly with the material it is to color. The entomologist or phytopathologist then must determine that the combination has not reduced the material's effectiveness. The horticulturist must prove that the new combination will not harm the growing crops. Complications multiply, multplied again by variations in temperature, sunshine, humidity, even the water available at the factory where the colored product is made and in the field where it is finally diluted in the sprayer.

Leaving the farm field, look back to Bataan, Guadalcanal and North Africa. Consider the insect-borne human diseases—malaria, yellow fever, typhus and others. Go to our own Gulf states where farmers find many of their animals killed and the others weakened by such pests as the dog fly. Medical chemists continue devising medicines to save the insect's victim. The insecticide chemist's job, now infinitely vital to the Army, is to kill the insect.

That is why airplane contractors sprayed paris green insecticide over the Potomac Valley swamps, to kill mosquitoes in a section thick with Army camps. That was what led to the aerosol "bomb", one of the chemical triumphs of Army insect protection in this war.

The aerosol story by now is well known. Dichlorodifluoro-methane and a specially refined non-irritating pyrethrum extract are compressed in a hand-size steel cylinder with needle valve. The soldier releases a "shot" of the vapor in his pup tent, in a native hut, inside a bombing or cargo plane, wherever there is danger from malaria-bearing mosquitoes. The result is so highly prized that production is being stepped up under Government urging; pyrethrum and the refrigerating gas "vehicle" are al-

most wholly withdrawn from civilian use; and a chemical substitute has replaced pyrethrum even in the Army's louse powder.

That substitute is diphenyl trichloroethane, which according to Dr. R. C. Roark of the Bureau of Entomology and Plant Quarantine was first made some seventy years ago in a German university. What is new about it is the discovery of its insecticide possibilities, now being explored for possible farm use.

Some chemists believe that countless other chemicals have insecticide and fungicide qualities, offering a tremendous field for research among old materials. There may be an analogy to the medical use of dyes, which when developed were intended only to color, with no thought of medicinal use.

Looking ahead, what is the post-war future for insecticide and fungicide chemists?

The commercial farmers' use of insecticides and fungicides seems certain to increase tremendously. Consider also this year's 20,000,000 Victory gardeners.

Most of them have had their first contact with plant insects, plant diseases and protective chemicals. This year brought indications that the average home gardener is hungry for more information about pest control methods and materials. His number is expected to grow.

Men in the armed services, meanwhile, are enjoying the benefits of aerosol. Many will have use for the new louse powder. Still other examples of the chemist's work will be impressed on them. Returning, they will demand and get scientific insect control in their homes.

There is no need to speculate on possible post-war export markets. The American farmer will have to continue full speed for several years, to help meet world needs. He needs the chemist's help.

He's only beginning to realize how much he wants it, or what it can mean in the saving of crops.

Cereal Chemists Oppose Kilgore Bill S-702

The American Association of Cereal Chemists recently endorsed a resolution opposing the enactment of the Kilgore-Patman Bill, on the grounds that it would have a disturbing effect upon the war effort and upon the future technical progress of the nation.

Calcott Assistant Research Director

William S. Calcott, F.A.I.C., was appointed assistant chemical director in charge of development of the organic chemicals department of E. I. du Pont de Nemours and Company. He was formerly director of the Jackson Laboratory of du Pont at Deepwater, New Jersey.

Research and the Patent System

H. Wickliffe Rose

Coordinator of Research Planning, American Viscose Corporation, Wilmington, Delaware

This is part of a series which has appeared in recent issues of *Textile Research*. The complete series of five articles bound in a pamphlet entitled "Planning Corporate Research and Development" are available on request from *Textile Research*.

THE benefits accruing from employment of patents far outweigh the bother and abuses caused by those who exploit them. The very fact that there are patent racketeers increases the use of the patent system by some corporations. Although the defensive tactic of patenting all possible ways of doing something in order to protect the corporation from a possible holdup undoubtedly burdens the Patent Office with inoperative patents, it still has the good effect, and one which is of much more importance, of stimulating research and development. It was with that primary purpose that the original patent law was enacted. A corporation which has been passive to patents, using those which it might have acquired in the natural course of its business, without much thought about them one way or the other, should have the experience of employing a patent estate commercially in a comparatively new field to see the stimulating and concentrating effect it has on the men doing the development work.

Part of the benefit from applying for patents comes from reduction to writing and reduction to practice. The test of patentability will often filter out nebulous ideas and faulty designs. If an idea has not enough essence to pass through the point of a pen it probably is not ready to aid the corporation; and if a device or formula does not work, it obviously must be corrected before it can be used. It usually follows then, that the patent-minded corporation is orderly minded in its organization and conduct of work.

Nor should a corporation overlook the individual personal effect of patents. A patent can be a reward for a particular piece of research which constitutes the scientists only return, and in the patent

he takes the same pride that an author does in a book. Just as there are books of poems published by authors at their own expense, so there are patents issued which are doomed, before they are issued, never to be employed. To that extent again, the Patent Office is burdened, but there is justification for much of it. There are only so many opportunities for a man to derive recognition and pleasure from his work, and, if it is not carried to extremes, this one should not be denied. Patents are also a reward for the group and department as well as for the individual. In many companies the number of patents acquired is a measure of the year's accomplishments in research in the same manner as the financial returns in royalties are credited to the cost of research.

Commercialization of Patents

Patent-minded corporations which are competitors sometimes find patent pools to be of mutual benefit and in the public interest. In the war of ideologies some words have had their edges sharpened and have been used as weapons instead of purveyers of thought. The term patent pool has been sharpened into a weapon, together with the word monopoly, and both have been so used that sometimes we almost forget that both can be beneficial in the public interest.

There is the case of a patent pool, currently active, which is speeding up a development for the war program, and which is in the public interest now and in peace time. Before the pool was formed, and one member was made the administrative head, each party was secretive about his own developments. There was considerable difference in techniques, some diametrically opposed, and the public was being deprived of an important product based on the best practice possible. Although the pool today does not include all competitors active in the field, and should any of the patents be contested or invalidated, which would be unfortunate, nevertheless the pool has already opened up the development and effected an exchange of information which will benefit the war program and the public. The results cannot but be beneficial to the units in the industry, even to those who have contributed nothing, taken no part, or even opposed it, for the markets and technique are becoming established.

The corporation that employs patents freely is familiar with the art in patent literature. This might be assumed to be universal practice, but it is no mean task to get up to date in some subjects, and it is even a greater task to remain so. The organization of research in a large corporation ordinarily provides a patent attorney on the staff of each director of research. At

least there should be a central patent department easily accessible to all research laboratories, in addition to outside counsel. The patent attorney can be of great assistance both in bringing the subject of an art up to date for the researcher and in abstracting and interpreting current patents in a given subject. Such attorneys are probably currently engaged in the most concentrated study they have ever made because of the Alien Property Custodian list. In addition to the academic work in patent literature, staff attorneys are frequently of great value as inventors. While diplomacy usually dictates that the invention come through a researcher, the specialized training and knowledge of the patent attorney place him in position to see the solution to a number of research and development problems.

The main point, which can form a guide in the employment of patents, is the question of whether they are in public interest. Herbert Morrison, British Home Secretary said in a recent speech, "Social control of production may take different forms. The sole test must be whether or not public interest is served." If the patents, or pool, or estate passes that test then it follows almost as a correlary that it is in the interest of the corporation. With the future course of the law uncertain, both as to patents and corporations, a course of action which meets this test would hardly come into serious conflict with either. If it should, however, then quite possibly the conflict will be worth while in its effect in steering the course of law to coincide with the ultimate public interest. Granted that judging the public interest is a large order in itself, yet each individual and each body of management has the responsibility of being its own bar and bench.

Having determined the broad interest, and assuming a commercial interest in the patent, there should be evaluated, in the order of importance a license or licensing program, royalty, price, and terms of agreement.

The first three, license, royalty, and price should be considered first in regard to validity. In a patent system in which validity is not certain until litigated, in which decisions are frequently adverse to patents, and in which litigation is costly in time and money, the question must be carefully weighed whether to employ the patent alone or commercialize it and invite possible opposition.

Balancing this equation is the fact that access to the invention at low cost prevents opposition in many cases. The amount of the royalty, therefore, should be considered both to close the deal and to avoid a contest if there is doubt of valid-

ity. Furthermore, whether to charge a royalty at all must be considered in its effect, per se, in validating the patent. The method of billing and collecting the royalty must also be considered, particularly if the patent is to be employed in connection with the sale and use of material not subject to patent.

The cash payment, if any, again must be considered both as to its effect in closing the deal and in respect to validating the patent.

The Agreement

The simple agreement is preferable to the lengthy and involved one. In a complex subject, a simple agreement is not always practical, but patents and their commercialization can be made more attractive to the average business man if they are accomplished briefly. There is no time to indulge in the luxury of unnecessarily lengthy documents. Forms required by Washington today only prove in exaggeration the burden that can be placed on business by paper work.

An agreement is an expression of intention. One of the main purposes of a written agreement is for the guidance of others as well as those who may have made it personally. If the main intent is covered in language clear to anyone, the purpose of the agreement is accomplished. As an attempt is made to cover every possible contingency, then the question becomes less of what is included and more of what is omitted. The best agreement is the one sufficiently flexible to work under unforeseen contingencies. One of man's failings lies in his urge to impinge an inflexible will on the future. The ideal agreement, therefore, is not a monument to the architectural ability of the attorney who drew it, but a product of his collaboration with those who must live with it.

The type of license is of interest. The restrictive license has been the subject of discussion for reform. The answer again might be found in the ultimate public interest. The reaction to elimination of the restrictive license might be less liberality rather than more; for there are many cases in which a license could be refused quite justly, if it could not be restricted. Should compulsory licensing be coupled with abolition of the restrictive license, the patent system probably would be more damaged than improved. The result would be a tendency to the socialization of industry, which course would carry it more directly into government control.

Most licenses, however, are simple and unrestricted. Some are so simple that they are verbal, but the written license is preferable. There should be some record both for the guidance of business conduct and for reference in connection with changes. The state of an art and a business evolve

so rapidly in this fast moving industrial world that agreements are frequently amended or entirely rewritten to keep them accurate and in step with actuality.

In developing a patent estate, licenses are sometimes necessary to cover experimental work done by others. Such a license can be issued with or without prejudice to the others position in respect to validity. Such an arrangement can speed up a development through collaboration without the loss of control and the loss of investment and interest. Patents lend an incentive to long and laborious development through control. Politically again, control sounds like monopoly, while industrially it is a necessity in every phase of a well organized operation. The experimental license maintains control by providing for assignment.

Technical service can form part of an agreement which is in everybody's interest. Employment of patents, as compared to exploitation, is best accomplished by a full and continuous exchange of information if an estate in a growing art is involved. A working agreement is, in such cases, better than a static agreement or bill of sale. Collaboration is advantageous to both parties and to the development. Mutual confidence is, therefore, in the public interest, and should be the basis of research, development, and the commercialization of patents.

In the employment of patents, trademarks play an important part. In fact, they can be a vital element in a business. Separate and special study is undoubtedly given to the subject of trademarks. In the industrial corporation, the subject is handled by the patent department and by patent counsel. It is appropriate that this should be, for the trademark is the manifestation of the ultimate in the power of a word, in a profession which is founded on precision of language, and in a branch of that profession which is dependent on definition. Trademarks are prolific seeds in the semantics of business, and wherever possible they should be farmed out with patents.

Patents are well known to have a value for trading or cross licensing. Where two companies have patents of mutual interest, exchanging licenses is a natural and simple commercial transaction. Sometimes cross licensing is accomplished with greater ease than a sale for net cash, even though a patent represents a definite investment. If the price is fair, there should not be that difference of view, but such differences exist, and it seems to be more a part of human nature than bookkeeping.

Future Problems and Prospects

The foreign rights in patents and their commercialization constitute a problem which is speculative, and dependent on many questions to be answered by the war or thereafter. The countries in which we can oper-

ate commercially with patents at the present time obviously are greatly reduced in number.

One prospect which seems to be fairly certain, if we can reason by analogy, is that after the war there will be a tremendous surge of research, development and production. In it all, there will be required more patents than ever before and more work in the patent profession to handle them. Statistics of the Patent Office show that during each war there has been a leveling off of the number of patent applications filed, but following the war in each case there has been a sharp rise in the number. Following the Civil War, the number had tripled by the second year. After the Spanish American

Applications Filed and Patents Issued, 1921-1938.

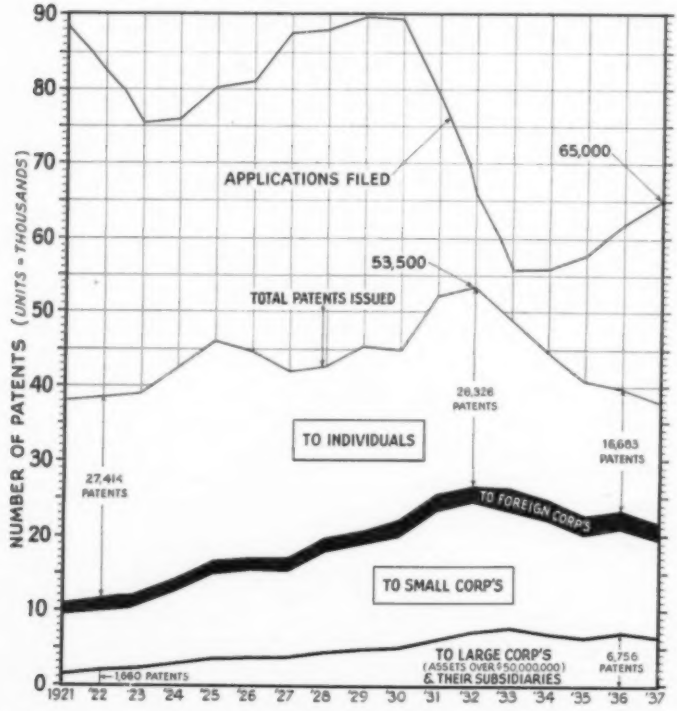

Chart from "Patents and Industrial Progress." Geo. E. Folk, Harper & Bros., New York.

War the number increased almost steadily from approximately 42,000 in 1900 to approximately 70,000 in 1914. After the World War the number of applications jumped to over 90,000 in 1921. The patent curve follows very closely that of economic prosperity.

Reading such charts, one can hardly fail to note the depressions that follow these booms after each major war. Reasoning further by analogy, and assuming that there will be a business boom after the present war, the natural reaction is to try to guard against the depression which seems to be nearly as inevitable. The planning of research, patents, building, and expansion should extend at least that far in the future.

As to the future of patents and the system, we can rest assured they will be in demand as long as man is acquisitive. He will be deprived of possessions and his pride of possession only in a state and social economy quite different from what we have known as democracy.

National Oil Products' Personnel Promotions

National Oil Products Company, Harrison, New Jersey, has appointed Dr. Kenneth Morgareidge as head of the Nopco Biological Assay Laboratories. He was formerly associate head of the Nutritional Laboratory. Dr. John R. Foy was appointed assistant head of the Biological Assay Laboratories to fill the vacancy created by the recent resignation of Mr. F. D. Baird.

William H. Gabeler, F.A.I.C., formerly vice president of Davison Chemical Company, is now vice president of the Summers Fertilizer Company, Baltimore, Md.

Davis with Drew and Company

Lloyd W. Davis, F.A.I.C., secretary of the New York Chapter of the INSTITUTE, is now with E. F. Drew and Company, Boonton, New Jersey. He was formerly research chemist with National Oil Products, Harrison, N. J.

Snell Staff Increased

Foster D. Snell, Inc., has added the following new members to its staff: Harold M. Schiller, formerly with Norda Essential Oil and Chemical Company; Arthur Streuli, recent Lehigh graduate; Henry A. Tisch, formerly with American Chicle Company; Robert W. Pease, formerly with Calco Chemical Company; and Ida Borowich, recent Hunter College graduate.

Using the Old Bean

Weare Holbrook

Reprinted from "This Week" October 3, 1943

BECAUSE of the meat shortage, there is a fortune waiting for the genius who can turn a silk purse into a sow's ear. But because of the silk shortage, the fortune will have to wait.

Nevertheless we are doing pretty well with what we've got. Thanks to modern science, miracles are a matter of everyday routine. The first time somebody told me that freight-car wheels were made of paper. I didn't believe it. And when I was informed that poker chips were made of milk, my incredulity increased. "Paper rustles and milk sloshes," I reasoned. "But who ever heard of a rustling freight-car wheel or a slosh-ing poker chip? It doesn't make sense."

If you had told me 20 years ago that the time would come when all our gin would be converted into high explosives, I would have laughed—for in those days all our high explosives were being converted into gin, and I laughed easily.

He'll Believe Anything

Now, however, nothing surprises me. After seeing what the boys with the test tubes can do, I am willing to believe anything.

Take soybeans, for instance. I can remember when all soybeans were good for was to make sauce for chop suey; you sprinkled it out of a sham-poo bottle to relieve the monotony of the boiled rice.

But today the soybean is every-where. The scientists have torn it down and built it up again into milk, flour, fuel, and plastics in a thousand far-fetched forms. It is animal, vegetable, and mineral. It is in this room.

Did you know, for example, that the steering wheel of your car is probably made of soybeans? Did you even know that you had a car? Soybeans are responsible for the ash-tray into which you flick your cigar-ette, and the imitation leather up-holstery upon which you sit; they can simulate wood, metal, fabric and food.

The Professor's Excited

Where will it all end? Well, my old friend Professor Upton O'Good seems to have the answer. I found him in his laboratory yesterday, in a state of high excitement. Sur-rounded by his tubes, coils, retorts and Bunsen burners, he looked like Boris Karloff in a Class B thriller.

"Success at last!" he hissed, bending over a beaker cradled in blue flame. "For years I have toiled to achieve an exact scientific compound of substitutes—taking minute quantities of synthetic flour, milk, fuel oil, plyboard, rubber, and costume jewelry, reducing them to their elements, and then fusing the elements into a perfect whole. And here is the result!"

With a pair of forceps he removed from the beaker a small oval object, pale green in color.

"What is it?" I asked.

"What Is It?" echoed Professor O'Good triumphantly. "A synthetic soybean!"

For a Better World

"Science has accomplished so much in the modern world—its achievements are so evident all around us . . . —that we assume that it contributes to human welfare. Yet we have been faced by the stark facts of poverty and unemployment in the midst of plenty, ignorance in an age of enlightenment, and finally, total war, meaning total destruction, in an age supposed to be dominated by science, which is essentially a builder and not a destroyer. Can we, as scientists, look at the world today and say we have done all we could to make our work contribute to human welfare? . . . How can we direct our work as scientists to prevent wars and to create peace, plenty and opportunity for far more of the world's people? Those are the kinds of problems we must face in our thinking and planning."

—E. C. AUCHTER,
Research Administrator,
U. S. Department of Agriculture.

Science Must Lead

"In a time of intense social strife the knowledge of the world that we call science is a source of tremendous strength. Nothing is so clear as that a nation which abandons science must soon become weakened. The world's leadership must go to those who are served by science and technology." —ARTHUR H. COMPTON.

Unscientific Leadership

The same effort expended for peace which Germany expended for two wars would have made her the richest and most prosperous country on earth. The first war dissipated Germany's wealth and left her with a small residual of export chemical industry—organic, inorganic and metallurgical, but with her manufacturing plants intact. That second war will leave her with many of her plants wrecked, her residual export chemical industry lost and her mechanical plants useless.

—Gilbert E. Seil, F.A.I.C.

COUNCIL

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Niagara
A. W. Burwell

Philadelphia
J. M. McIlvain

Washington
Albin H. Warth

Chicago
Howard Adler

September Meeting

A meeting of the National Council of The American Institute of Chemists was held on Wednesday, September 22, 1943, at The Chemists' Club, 52 East 41st Street, New York, N. Y., at 6:30 p.m. President Gustav Egloff presided.

The following officers and councilors were present: Messrs. E. R. Allen, F. G. Breyer, G. Egloff, F. A. Hessel, R. J. Moore, R. E. Kirk, H. S. Neiman, D. Price, J. M. McIlvain, F. D. Snell, A. Lloyd Taylor, M. Toch, and W. D. Turner. Mr. T. S. McCarthy and Miss V. F. Kimball were present.

The minutes of the previous meeting were approved.

The Treasurer reported $1,353.75 cash on hand.

Dr. Gustav Egloff reported on his recent western trip, on which he met with chemists in Seattle, Portland, San Francisco, and Los Angeles and discussed with them their particular professional interests. In Los Angeles, the names of 2200 graduate chemists had been obtained by a member of the Institute who was making a census of chemists in that area.

Dr. Allen, Dr. Toch, Dr. Price, and Mr. Breyer contributed to a discussion of the professional status of chemists with reference to unions.

Upon motion made and seconded, the following members of a committee to consider this matter were appointed: Dr. Donald Price, Chairman; Mr. F. G. Breyer, and Drs. E. R. Allen, R. E. Kirk, and W. H. Gardner.

This committee was requested to find out if companies have made arrangements with unions to consider chemists as professional men, and the Committee was requested to prepare a suitable report for THE CHEMIST on its findings.

The Secretary reported that we now have 1,798 members.

Upon motion made and seconded, Herman Maisner was reinstated to Fellow membership.

Upon motion made and seconded, Harry L. Cole was reinstated to Fellow membership.

THE CHEMIST was discussed and suggestions were offered for improving it and for obtaining more advertising. It was also suggested that the INSTITUTE publicise its objectives more regularly. Mr. Breyer suggested that an article by one of our members appear each month entitled "Why I Belong to the INSTITUTE."

Upon motion made and seconded, the following resolution was passed:

Resolved, that the President, Treasurer, and Secretary be empowered to sign forms controlling the moneys in the Emigrant Savings Bank and that the Bank is authorized to recognize such forms when they are signed by any two of the above.

Upon motion made and seconded, the Treasurer was instructed to invest $2000 of the amount now in the savings account in Government bonds of the Third War Loan series.

Upon motion made and seconded, it was decided that those applying for membership should enclose the amount of their dues with their applications, and that unless dues accompany the application, it cannot be passed upon by the Council.

Upon motion made and seconded, it was decided to restore the dues of Fellows to the regular rate of $10.00 a year, of which $2.00 are allocated to the publication. (During the depression, Fellow's dues had been reduced to $5.00).

Upon motion made and seconded, it was decided to postpone the suggested special edition of THE CHEMIST for South America.

The Secretary announced that 454 members of the INSTITUTE had voted in favor of the Constitutional amendments sent out this year, with five ballots negative or without designation of vote.

Drs. Snell, Toch, and Turner reported progress for the Committee on Licensure.

The Secretary read a letter from Dr. A. H. Warth who is organizing

a Chapter of the INSTITUTE in Baltimore.

Upon motion made and seconded, it was voted to hold the next annual meeting of the INSTITUTE in New York, N. Y.

A letter from Sheldon, Morse, Hutchins and Easton was read, with regard to the publicity work which they did during the past year, and the Secretary was requested to write, expressing the appreciation of the Council.

A suggestion that THE CHEMIST be published twelve months a year, instead of nine, was referred to a committee consisting of the editor, president Egloff, Mr. Neiman, and Mr. McCarthy.

Dr. Price informed the Council that he was going to Buffalo shortly, and would be happy to meet with the members of the Niagara Chapter then.

Upon motion made and seconded, the following new members were elected:

FELLOWS:

Anderton, Benjamin A.
(1943), *Supervisor Bituminous Materials*, Research and Development Department, The Barrett Division, Allied Chemical and Dye Corporation, Edgewater, New Jersey.

Barrick, L. D.
(1943), *Chemist*, General Aniline and Film Corporation, Grasselli, N. J.

Chalupski, Victor
(1943), *Chemical Engineer*, E. I. du Pont de Nemours and Company, 256 Vanderpool Street, Newark, N. J.

Field, Theodore E.
(1943), *Director of Research*, Corhart Refractories Company, 1600 W. Lee Street, Louisville 10, Ky.

Flett, Lawrence H.
(1943), *Group Leader*, Research Department, National Aniline Division, A. C. and D. Corporation, Buffalo, New York.

Hanke, Albert R.
(1943), *Research Chemist*, E. I. du Pont de Nemours and Company, 256 Vanderpool Street, Newark, N. J.

Jones, Haydn
(1943), *Research Associate*, Clinton Laboratories, Box 1991, Knoxville 9, Tennessee.

Jones, Llewellyn
(1943), *Research Chemist*, Hizone Products, 1211 Washington Avenue, Wilmette, Illinois.

Joy, Homer van B.
(1943), *Research Chemist*, Montclair Research Corporation, 4 Cherry Street, Monclair, N. J.

Monks, James W.
(1943), *General Manager*, Poughkeepsie Dyestuff Corporation, 77 North Water Street, Poughkeepsie, New York.

Shepard, Bernard J.
(1943), *Chemical Division Manager*, Packing Products Company, 271 Church Street, New York, N. Y.

Sleichter, George M.
(1943), *Professor of Chemistry*, Cincinnati College of Embalming, 3202 Reading Road, Cincinnati, Ohio.

MEMBERS:

Kinneberg, Ivar
(M.1943), *Research Chemist*, Universal Oil Products Company, Drawer C, Riverside, Illinois.

Siggia, Sidney
(M.1943), *Research Fellow,* Polytechnic Institute of Brooklyn, Brooklyn, New York.

ASSOCIATES:

Albert, John R.
(A.1943), *Research on Battery Building,* National Lead Company, 105 York Street, Brooklyn, N. Y.

Riley, William C.
(A.1943), *Bacteriological Chemist,* Crown Cork and Seal Company, Baltimore, Maryland.

Stein, Sidney J.
(A.1943), *Chemist,* Amecco Chemical Company, 75 Rockwood Street, Rochester, N. Y.

West, Samuel R.
(A.1943), *Chemist,* Rocky Mountain Arsenal, Denver, Colorado.

Upon motion made and seconded, Kenneth E. Shull was raised from Associate to Fellow; Lowell Senter from Associate to Fellow, and Joseph Sausville from Junior to Member.

There being no further business, adjournment was taken.

Applications for Membership

For Life Member

Udy, Marvin J.
Vice President, Charge of Research and Development. Chromium Mining and Smelting Corporation. Sault Ste. Marie, Ontario, Canada.

For Fellows

Bredig, Max A.
Manager, Applied Chemicals Division, Vanadium Corporation of America, 420 Lexington Avenue, New York, New York.

D'Alelio, Gaetano F.
Director of Research, Pro-Phy-Lac-Tic Brush Company, Pine Street, Florence, Mass.

Dolid, Jacob
Research Chemist, Thermoid Company, Trenton, N. J.

Fisher, Jr., John R.
Research Chemist, Chemical Development Corporation, 314 West First Street, Dayton, Ohio.

Gabriel, Charles L.
Vice President (in charge of New Development). Publicker Commercial Alcohol Company, Philadelphia 2, Pa.

Glaser, Milton
Chief Chemist and Director of Research, Standard Varnish Works, 2600 Federal Street, Chicago, Ill.

Hasselstrom, K. Torsten H. A.
Director of Research, G. and A. Laboratories, Inc., Exley Avenue, Savannah, Georgia.

Hegyi, Imre J.
Chemist, Baker and Company, 113 Astor Street, Newark, N. J.

Katz, Jacob
Chemical Engineer, Alrose Chemical Company, 180 Mill Street, Cranston, Rhode Island.

Koch, Fred C.
Director of Biochemical Research, Armour and Company, Armour Laboratories, 1425 West 42nd St., Chicago, Ill.

Martin, James W.
Consulting Engineer, 111 Broadway, New York, N. Y.

Merchant, Paul W.
Associate Chemist, P-3, Pine Bluff Arsenal, C.W.S., Pine Bluff, Arkansas.

Stamberger, Paul
Senior Chemical Engineer, Eastern Regional Research Laboratory, Chestnut Hill Station, Philadelphia, Pa.

Strickland, Mrs. Elizabeth D.
Research Chemist, Chemical Developments Corporation,, 314 West First Street, Dayton 2, Ohio.

Waldie, William A.
Technical Director, New Wrinkle, Inc., 314 West First Street, Dayton 2, Ohio.

Ziegler, Lena R.
Patent Chemist, Chemical Developments Corp., 314 West First Street, Dayton 2, Ohio.

For Members

Berger, Howard H.
Chemist, Plymouth Rubber Company, Canton, Massachusetts.

Gakenheimer, Walter C.
Research Chemist, Minerec Corporation, 3508 Fairfield Road, Baltimore 25, Maryland.

Landrum, Leslie H.
Research Engineer, Chemical Developments Corporation, 314 West First Street, Dayton 2, Ohio.

Staub, John H.
Research Chemist, Barrett Division, Allied Chemical and Dye Corporation, Margaret and Bermuda Streets, Philadelphia, Penna.

White, Edward A.
Instructor, Department of Chemistry, Fordham University, New York, N. Y.

For Associates

Coleman, Anna M.
Fellowship Assistant, Gas By-products. Mellon Institute of Industrial Research, Pittsburgh, Penna.

Woodson, Harold W.
Assistant in Department of Physiological Chemistry, University of Illinois, College of Medicine, Chicago, Ill.

Donnellon, John B.
(32192490), Sergeant, Hq. Sq. 5th Wing (US), A.P.O. 520. C/o Postmaster, New York, N. Y.

To be Raised from Student to Member

Schachtmeister, Sydney C.
A.S.T.P. Student, U. S. Army, Company G. A.S.T.U. 3900. Oregon State College, Corvallis, Oregon.

CHAPTERS

New York

Chairman, M. L. Hamlin *Vice-chairman,* Franklin H. Bivins

Secretary-treasurer, Lloyd W. Davis

National Oil Products Company
Harrison, New Jersey

Council Representative, A. Lloyd Taylor

Meeting November 19th. Building Trades Association Club, 2 Park Avenue, New York. N. Y. Dinner at 6:30. Guest speakers will include Dr. Charles Glen King and Harry B. McClure.

Niagara

Chairman, Maurice C. Taylor *Vice-chairman,* Lawrence H. Flett

Secretary-treasurer, M. R. Bhagwat

1104 Ferry Avenue

Niagara Falls, New York

Council Representative, Arthur W. Burwell

Alternate, Lothar A. Sontag

Reporter to THE CHEMIST, Frederick Koethen

An impromptu dinner was held at the Westbrook Hotel, Buffalo, New York, on October fourth, at which Dr. Donald Price, vice president of the INSTITUTE, spoke on the activities of the INSTITUTE during the past year. Following the talk, the members discussed future plans for continuing professional activities, and expressed enthusiasm for the work now being done. Among those present were: Miss Margaret Swisher, Messrs. Frederick Koethen, Frederic L. R. Sievenpiper, L. H. Flett, L. M. Lawton, Carl H. Rasch, M. R. Bhagwat, Maurice C. Taylor, Arthur Flentge, Alvin F. Shepard, Lothar A. Sontag, John F. Seubert, and William R. Sheridan. New officers were elected. (See names shown above).

Chicago

Chairman, Hilton I. Jones *Vice-chairman,* H. R. Kraybill

Secretary-treasurer, Charles L. Thomas

Universal Oil Products Company
Riverside, Illinois

Council Representative, Howard Adler

Pennsylvania

Chairman, Clinton W. MacMullen *Vice-chairman,* Glenn E. Ullyot
Secretary-treasurer, Kenneth E. Shull

23 Bala Avenue
Bala Cynwyd, Pennsylvania

Council Representative, John M. McIlvain

Washington

President, L. F. Rader, Jr.

Vice-president, Donald H. Andrews *Treasurer*, L. R. Heiss

Secretary, Ernest J. Umberger
207 Albany Avenue, Takoma Park, Maryland

News Reporter to THE CHEMIST, T. H. Tremearne
Council Representative, Albin H. Warth

Government Technical Advisory Service

The Smaller War Plants Corporation has established a Technical Advisory Service to serve the interests of small plants. Information from government agencies, trade associations, technical and scientific organizations, technical magazine editors, and research laboratories of educational institutions and private industry will be provided for the assistance of the small manufacturer who requires help to solve production problems.

Baltimore Chapter Under Consideration

Plans for the formation of a Baltimore Chapter of the INSTITUTE were discussed at a meeting September 23rd, at Loyola College, according to Albin H. Warth, F.A.I.C. Dr. Giles B. Cooke gave an illustrated lecture on "Domestic Cork Growing".

Marshall J. Goss, F.A.I.C., technical assistant with the Bureau of Agricultural and Chemical Engineering, United States Department of Agriculture, Washington, D. C., is now serving as colonel in the Chemical Warfare Service.

Arthur M. Buswell, F.A.I.C., professor of chemistry at the University of Illinois, is on leave of absence on military duty. As major in the Sanitary Corps of the Army, he is stationed at the Medical Research Laboratory, Edgewood Arsenal, Md.

Hilton Ira Jones, F.A.I.C., speaking in Chicago before a recent meeting of the Mortgage Bankers' Association of America, predicted that spun glass in addition to its industrial uses, may also be used as dress fabrics of the future.

Necrology

Henry Leonard Borg

Dr. Henry Leonard Borg, vice president of The Murray Company, Boston, died October 12, 1942, in Newton, Massachusetts, according to word recently received from Mrs. Borg. He was fifty-nine years of age.

A native of Bristol, Connecticut, Dr. Borg was educated at Columbia University where he received the Ph.D. in 1902. He also held the M.D. degree from Baltimore Medical College, and the Ph.G. from New York College of Pharmacy.

For a number of years he was chemist for the State of Connecticut, and also consultant.

He was a charter member of THE AMERICAN INSTITUTE OF CHEMISTS.

John Willard Hershey

Dr. John Willard Hershey, head of the chemistry department at McPherson College, McPherson, Kansas, died September twenty-seventh, at the age of sixty-seven.

Born in Gettysburg, Pennsylvania, he studied at Gettysburg College, Harvard University, Johns Hopkins, and the University of Chicago, receiving the Ph.D. degree from the latter institution.

After teaching several years in various colleges, he joined the staff of McPherson College in 1918. He was noted for his researches on the synthesis of diamonds, and is credited with making the world's largest synthetic diamond.

He became a member of THE AMERICAN INSTITUTE OF CHEMISTS in 1932.

Richard Fay Jackson

Dr. Richard Fay Jackson, senior chemist, National Bureau of Standards, Washington, D. C., died June first, at the age of sixty-two.

He was born in Boston, Massachusetts, and educated at Harvard where he received the Ph.D. degree. After two years on the faculty of the Massachusetts Institute of Technology, Dr. Jackson joined the Bureau of Standards in 1907. He was well-known for his research on carbohydrates.

He became a member of THE AMERICAN INSTITUTE OF CHEMISTS in 1937.

Carl O. Johns

Dr. Carl O. Johns, widely known chemical consultant, died at his home, Manhasset, New York, April 17, 1942, at the age of seventy-two.

He was born in Sweden and came

to this country at an early age, where he attended Bethany College, Lindsborg, Kansas, and Yale University from which he received the Ph.D. degree in 1906. He was honored with the Sc.D. degree from Bethany in 1922.

He served on the faculty of Yale University for ten years, and in 1914 joined the staff of the U. S. Bureau of Chemistry to do research on proteins and amino acids. In 1920 he became consultant to the Standard Oil Company of New Jersey.

He became a member of THE AMERICAN INSTITUTE OF CHEMISTS in 1937.

John Lafayette Martin

John Lafayette Martin, chief chemist at the Plymouth Meeting Laboratories of E. J. Lavino and Company, died October 29, 1942, at the age of forty-five.

Born in Newfoundland, Pennsylvania, he received the degree of B.S. in chemistry from Pennsylvania State College in 1921, the year in which he joined Garrett, Brownback and Sons, Linfield, Penna. He was associated with William P. Young from 1924 to 1928, when he joined the Lavino firm.

He became a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS in 1938.

Elmer Otto Kraemer

Dr. Elmer Otto Kraemer, internationally known for colloids research, associated with the Biochemical Research Foundation, Newark, Delaware, died September seventh while attending a meeting of the American Chemical Society in Pittsburgh. He was forty-five years of age.

Born in Liberty, Wisconsin, Dr. Kraemer, obtained the Ph.D. degree from the University of Wisconsin, in 1924, and also studied at the University of Upsala, Sweden, and the Kaiser Wilhelm Institute, Berlin.

Previous to joining the Biochemical Research Foundation, he was for ten years affiliated with E. I. du Pont de Nemours and Company as research group leader.

He joined THE AMERICAN INSTITUTE OF CHEMISTS in 1937.

Dr. James Morton

Sir James Morton, chairman of the board of Morton Sundour Fabrics, Ltd. of Carlisle, England, died recently. He was seventy-six years of age. Sir James was credited with being the first manufacturer who produced fabrics guaranteed to hold color against the action of sun or water. He was a director of the Imperial Chemical Industries, Ltd.

For Your Library

NOXIOUS GASES AND THE PRINCIPLES OF RESPIRATION INFLUENCING THEIR ACTION. By Yandell Henderson and Howard W. Haggard. *Reinhold Publishing.* 1943. 294 pp. 6" x 9½". $3.50.

This book has been written for the practical use and information of those in industry who are charged with the protection of personnel from noxious gases encountered in manufacturing processes. A rather full description of the function of respiration is given in order to make clear the way in which the various gases affect the body. Only industrial gases are dealt with. War gases are not considered here.

The authors have adopted a novel and most informative means of classification of the gases, ignoring the general classifications as to chemical composition, and grouping them according to their effects upon the respiratory organs. The chemical and physical properties of these noxious gases are given in detail, supplemented in each case by their effect upon the body.

This is a worth-while book for every one interested in protection against the serious effect of gases of this character.

STAPLE COTTON FABRICS. By John Hoye. *McGraw-Hill Book Company.* 1942. 241 pp. 6¼" x 9¼". $3.50.

This book illustrates that frequently one who is interested in the commercial products of his industry is without a comprehensive knowledge of the underlying facts upon which his industry is founded, and this is particularly evident in the production of fabrics.

Advancements in weaving are generally results based upon what someone else has produced before, a continuous building of new edifices upon a common foundation, whereas a knowledge of that basic construction might indicate an entirely new fabric.

The most important discoveries have been made by those who parted from the old lines of research and who started upon an entirely new line of thought, based upon a knowledge of the properties of the original material.

The author has successfully succeeded in placing before his readers a knowledge of the physical and chemical properties of the fibers, thus enabling the production of new and valuable results. He describes the many kinds of fabrics and then relates the combinations and derivatives of these cloth constructions, thus energizing the inventive facilities of the

reader into the commercial production of new fabrics with increased attractiveness and appeal.

The information within this book will be found to be of the greatest value to both the beginner and to the man at the loom, and a copy should be in the library of every textile worker.

SCIENCE MAKES OUR WORLD. By James Stokley. *Ives Washburn.* 1942. 298 pp. 6″ x 9″. $3.50.

Here is a book that will be appreciated by the ordinary reader as it will give him a new idea of the importance of science in the building of our present civilization. The scientist will find increased enthusiasm to expand his efforts for the advancement of the world in which we live.

The author has taken many of our human activities as texts and has woven science into them for the production of interesting fabrics with which we cover our uncivilized nakedness.

This is a childhood-to-old-age book, for youth will find it a wonderful fairy story of facts and the oldsters will find it a factual story with the glamor of an imaginative fairy tale.

No one can read this book without a renewed appreciation that we are simply moving parts in a high scientific machine devised and erected by unselfish men who have given their thoughts; their time and their money for the betterment of the human race.

AN ELEMENTARY COURSE IN QUALITATIVE ANALYSIS. By William Lloyd Evans, Jesse Erwin Day, and Alfred Benjamin Garrett. *Ginn and Company*, 1942. 240 pp. 7½″ x 10½″. $2.25.

The authors, outstanding members of the profession of chemistry at Ohio State University, have prepared a text so designed that students are able to grasp not only the fundamental principles of the subject, but are inspired to continue working in the field. This laboratory manual, in an attractive, simulated-leather, ring binder cover, contains an introduction to qualitative analysis; general instructions for laboratory procedure; the cations, a lecture-demonstration exercise; the anions; the analysis of unknown substances; the theory of qualitative analysis, and appendixes.

SEMI-MICRO AND MACRO ORGANIC CHEMISTRY. By Nicholas D. Cheronis. *Thomas Y. Crowell Company.* 1942. 388 pp. 6″ x 8½″. $2.75.

This laboratory manual is the result of years of trial in chemistry classes from which the author considers it possible to attain all the objectives of laboratory practice by both the average and exceptional students using the semi-micro technique.

The system employed is a logical one extending through elementary techniques, a study of the preparation and properties of the simpler groups,

the preparation of a few compounds from each group, followed by a systematic study of the entire subject.

The book contains outlines of seventy experiments which are indicative of further experiments upon other compounds of particular interest.

One important feature of the book is the experience it will give the student in the preparation of proper and informative reports, each of which is of sufficient scope and clearness as to indicate the various steps of the experiment. It is an important and valuable book for teachers of chemistry.

THE PAINT LABORATORY NOTEBOOK. By John Stewart Remington. *Chemical Publishing Company*. 2nd Edition. 1942. 138 pp. 5½" x 8½". $2.75.

The notebook is a collection of data which this British author has found to be useful when carrying out rapid tests of simple pigments and paints submitted to him for analysis, before conducting more exact quantitative tests. This edition incorporates methods for general tests for oils and more complete notes on volumetric analysis. Contents include simple tests for white pigments; simple tests for colored pigments; other tests (oils and turpentine); some physical tests; synthetic resins; and tables of useful information.

The Research Viewpoint, publication of Gustavus J. Esselen, Inc., recently took a vote among its readers on the most important industries of the future. These industries are, in the order of the highest number of votes: Aviation, radio and electronics, plastics, housing, alloys and metallurgy, food processing, synthetic rubber, chemical engineering, synthetic drugs, and automotive.

The U. S. Civil Service Commission has prepared two pamphlets concerning opportunities in scientific positions in the Federal service. "Serve in Federal Scientific War Work" describes the immediate needs of Federal agencies. "Opportunities for Chemists in Civilian War Service" is designed for those interested in a government career in chemistry.

Chemical Industries in its October issue carries a full page biographical sketch of our president, Dr. Gustav Egloff.

John J. Mahlman, formerly with Stein-Davis, Long Island City, New York, is now serving as ensign in the United States Coast Guard.

New York Guardsman

Donald Price, vice-president of The INSTITUTE, encamped with the New York State Guard, August 24th to September 2nd. Dr. Price, who is sergeant in Company G, 51st Regiment, served in World War One as second lieutenant of infantry.

Albert J. Cole, research chemist with Triumph Explosives, Elkton, Maryland, is now serving in the United States Naval Reserve as ensign, at Harvard Naval Training School, Cambridge, Massachusetts.

Marion Eppley, F.A.I.C., has been on active naval duty since April, 1941, at the Naval Operations Base in Newport, Rhode Island, and at the present time is chief of staff of a Naval Task Group.

Miller-Bhagwat

M. R. Bhagwat, F.A.I.C., and Miss Jean Miller of New York were married July eighteenth at Riverside Church, New York, N. Y. The couple are making their home at Niagara Falls, where Mr. Bhagwat is chemical engineer with Mathieson Alkali Company. He was formerly secretary of Chemist Advisory Council, New York, N. Y.

Roger H. Lueck, F.A.I.C., director of research of American Can Company, received the honorary degree of Doctor of Science from Carroll College, Waukesha, Wisconsin.

Sergeant Peter Dunne Garvan, son of the late Francis P. Garvan, Alien Property Custodian in World War One, reported missing in action after an air raid over Hamburg in July, is now reported to be a prisoner in Germany.

Chemist Available

PHYSICAL CHEMIST. Ph. D. with four years of industrial experience in the preparation and testing of adsorbents, and in colloidal and electrolytic solutions, desires a position with a company doing essential work. Single. 34 years old. II-B. Can obtain release on request. Please reply to Box 101. THE CHEMIST.

Meeting Dates

Oct. 18-21. American Welding Society. 24th Annual Meeting. Hotel Morrison, Chicago, Illinois.

Oct. 18-25. National Metal Congress. 25th Annual Meeting. Palmer House, Chicago. Illinois.

Oct. 21. National Council. THE AMERICAN INSTITUTE OF CHEMISTS. The Chemists' Club, New York, N. Y. 6:30 p.m.

Oct. 22. American Section, Society of Chemical Industry. Honorary dinner for Wallace P. Cohoe, F.A.I.C., newly elected president of the Society, Waldorf-Astoria, New York, N. Y.

Oct. 28-29. Joint Fuels Conference. A.I.M.E. and A.S.M.E. William Penn Hotel, Pittsburgh, Penna.

Oct. 27-28. Association of Official Agricultural Chemists. Statler Hotel, Washington, D. C.

Nov. 1-3. National Lubricating Grease Institute. 11th Annual Meeting. Edgewater Beach Hotel, Chicago, Ill.

Nov. 14-16. American Institute of Chemical Engineers. Pittsburgh, Pennsylvania.

Nov. 19. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. New York, N. Y.

Nov. 26-27. Central Association of Science and Mathematics Teachers. Annual Convention. Palmer House, Chicago, Illinois.

Dec. 3. Chicago Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Subject: "The Chemist Interviews the Employer." Speakers: F. A. Anderson, Thomas Coffer, M. T. Carpenter, and Victor Conquest.

Dec. 6-11. Chemical Industries Exposition. Madison Square Garden, New York, N. Y.

Jan. 14. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. New York, N. Y.

Mar. 17. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. New York, N. Y.

Apr. 14. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Student Medal presentation.

May 12. New York Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Annual Business Meeting.

May 13. THE AMERICAN INSTITUTE OF CHEMISTS. Annual Meeting. New York, N. Y.

Nelson Rockefeller, coordinator of Inter-American Affairs, recommends science as one of the finest mediums to promote friendship between Mexico and the United States.

Sterling Drug, Inc., has purchased a building and property at Brattleboro, Vermont, for the manufacture of cleaning fluid, shoe white, lighter fluid, and window cleaner.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc. REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, and MARCH 3, 1933

Of THE CHEMIST, published monthly except June, July, and August at New York, N. Y., for October 1, 1943.

STATE OF NEW YORK } ss.
COUNTY OF NEW YORK }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Vera F. Kimball, editor, who, having been duly sworn according to law, deposes and says that she is the Editor of THE CHEMIST and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Name of	Post Office Address
Publisher: THE AMERICAN INSTITUTE OF CHEMISTS,	60 E. 42nd Street, New York 17, N.Y.
Editor: Vera F. Kimball,	60 E. 42nd Street, New York 17, N.Y.
T. S. McCarthy,	59 John St., New York, N.Y.
Business Manager:	None

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given).

THE AMERICAN INSTITUTE OF CHEMISTS, INC., 233 Broadway, New York, N. Y.

(Non-profit making corporation. No stockholders.)

Gustav Egloff, President, Universal Oil Products Company, Chicago, Illinois.

Donald Price, Vice-president, National Oil Products Company, Harrison, N. J.

Frederick A. Hessel, Treasurer, 4 Cherry Street, Montclair, N. J.

Howard S. Neiman, Secretary, 233 Broadway, New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by her.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is——. (This information is required from daily publications only.)

Vera F. Kimball
(Signature of Editor)

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Central Scientific Company ... 434
Corning Glass Works ... Inside Front Cover
Croll-Reynolds Co. ... Outside Back Cover
The Emulsol Corporation ... 482
Reinhold Publishing Corporation ... 483
E. H. Sargent & Company ... 436
Schaar & Company ... 438
Texaco Development Corporation ... 440
Toch Brothers, Inc. ... 439
Universum Book Export Company ... 482
Universal Oil Products Company ... 437
Wishnick-Tumpeer, Inc. ... 487

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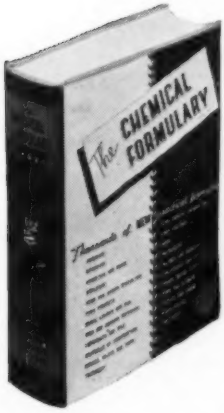

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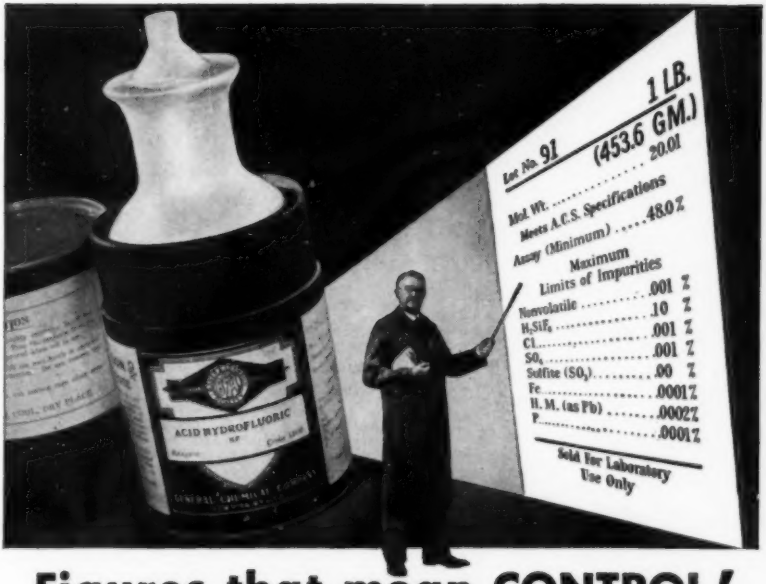

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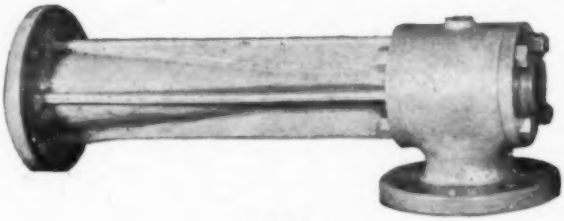

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